slowly to creep over the left eye. From these facts we can infer that the fall upon the head certainly had not injured the eye ; for the disturbance of its functions came on neither immediately nor suddenly, as it should had there been a direct traumatic lesion of the eye.

The slow and gradual growth of the detachment points to a gradual accumulation of serous fluid between retina and choroid, due to the gradual rise of an inflammatory action in the choroid. The late development of this choroiditis, the serous character of its products speak decidedly against the supposition of its being traumatic inflammation. And all the symptoms explain themselves as soon as we suppose that the choroiditis was a secondary affection, propagated from the brain through the inter-vaginal space of the optic nerve in the manner described above in connection with the other case.

ARTICLE IX.

THE VALUE OF WARM WATER IN SURGERY. By A. H. GOELET, M.D., of New York.

THE following cases are reported in substantiation of the views advanced by Dr. Frank H. Hamilton in a recent article in the *Buffalo Medical and Surgical Journal* for April, 1879. While the report covers only a limited range of the usefulness of *warm water*, it will be of practical value to all interested in surgical dressings. The cases illustrate the value of the use of warm water in *erysipelas*, especially *traumatic; lacerated* and *contused wounds* in general, but especially those of the *scalp*, which are so prone to take on erysipelas, and those of *compound fractures ; gunshot wounds ;* and *traumatic gangrene.*

Warm water may be applied in two ways, viz., 1st, by means of the water bath, in which case the limb is submerged in water kept constantly at the same temperature (generally about 100° F.), disinfected when so desired, and changed as often as necessary (about twice a day will generally suffice) ; 2d, by means of hot fomentations, which consist of a layer of cotton batting, or two thicknesses of sheet lint, saturated with hot water (previously disinfected if so desired), applied closely and evenly to the part, and kept at an even temperature by a covering of oiled silk. In this case it will be necessary to re-wet the dressing about every two hours, and change it twice a day, or oftener in cases where there is profuse suppuration. In cases of erysipelas the dressing must extend a little beyond the limit of inflammation.

Cases of Erysipelas:

CASE 1. *Laceration over Left Eyebrow ; Relative Value of Tr. Iodine and Hot Water.*—George M., æt. 14 years, was admitted to the Ninety-ninth Street Reception Hospital March 26, 1874, with the above injury, produced by falling from a rock. The edges of the wound were brought together by three sutures strengthened with adhesive strips.

27th. Tissues around wound look œdematous and red; painted with tr. iodine; sutures not removed.

28th. The surface for some distance around the wound has an erysipelatous blush; sutures removed, surface painted with tr. iodine, and covered with *warm water* dressing (?). The same treatment was continued until the 31st, when erysipelas had extended over the whole face. Iodine discontinued, and hot fomentations *only* applied. The internal treatment consisted of carbonate of ammonia and camphor.

On the following day (April 1st) the erysipelas was beginning to subside, and on the 5th it had entirely disappeared.

CASE 2. *Comminuted Fracture of the Lower End of the Humerus; Slough over External Condyle detached under Warm Water Treatment; Subsequent Development of Erysipelas; Relative Value of Tr. Iodine and Hot Water.*—Wm. D., æt. 13 years, was admitted to Ninety-ninth Street Hospital February 19, 1875, with above injury, having been thrown from a wagon, and struck by the wheel of a locomotive.

March 3d. A bluish spot made its appearance over the external condyle, which in a few days looked gangrenous, and hot fomentations were applied.

On the 14th this slough had become detached, and was removed, exposing the bone. After a few days a fragment of bone became loose, and was removed. Peruvian balsam substituted for the warm water dressing. A few days later erysipelas developed around the wound, and spread rapidly under the iodine treatment alone. It was then painted with tr. iodine, and hot fomentations applied (?), but the erysipelas continued to spread. By advice of Dr. Hamilton, who was our visiting surgeon, the iodine was discontinued, and the arm submerged in water, to be kept constantly at 100° F., to be changed and disinfected twice a day. It commenced to improve immediately, and in three days all signs of inflammation had disappeared.

CASE 3. *Severe Laceration and Contusion of the Foot; Syme's Amputation; Erysipelas of Stump; Relative Value of Cold and Astringent Applications, and Hot Water.*—Patrick G., æt. 21 years, single, labourer, admitted to hospital July 14, 1874. Amputation performed same day, and stump placed in wire suspension apparatus. Four days after (18th) erysipelas developed in the stump, and spread rapidly up the leg under the application of lead and opium wash.

23d. Under same treatment it has extended to the knee, and is of the cellulo-cutaneous variety. Poultices of flaxseed meal applied.

26th. No improvement. Erysipelas still extending. Lead and opium wash reapplied.

31st. The limb is in every respect worse. The erysipelas has extended some distance above the knee. It seems to have baffled the skill of our visiting surgeon (a skeptic as to the value of warm water), whose treatment had been followed up to this date. Hot fomentations were immediately commenced, and kept constantly renewed during the next forty-eight hours. At the end of that time the erysipelas had receded; the redness and swelling had to a great extent subsided; indeed, the improvement was wonderful. Six days after commencing the hot fomentations the erysipelas had entirely disappeared by resolution.

CASE 4. *Erysipelas of a Compound Fracture of the Leg; Developed under Imperfectly Applied Warm Water Dressing; Cured by its Perfect Application.*—J. T., æt. 60 years, male, labourer, admitted to Ninety-ninth Street Hospital January 26, 1875, with a compound comminuted fracture of the tibia and fibula, upper third. On the following day the limb was placed in a wire suspension apparatus and sheet lint, saturated with hot water, applied, but the covering of oiled silk was omitted, and the dressing was not reapplied sufficiently often to preserve an even temperature. Under this treatment erysipelas developed by January 30th, and spread rapidly up and down the leg.

February 1*st.* It was decided to apply the warm water dressing more perfectly, and the whole limb below the knee was enveloped in sheet lint wet with hot water, and the whole covered with oiled silk. In consequence, by the 3d the swelling and redness had disappeared to a great extent, and on the 5th it had entirely subsided.

Dr. Hamilton records one case in which erysipelas developed under the *warm water* dressing, but imperfect application was no doubt the cause, as it has never happened in my experience.

CASE 5. *Erysipelas from a Scalp Wound Rapidly Subsiding under the Warm Water Dressing.*—T. F., æt. 29 years, male, painter, was admitted to hospital January 14, 1875, with a wound of the scalp four inches long, extending from the left brow back across the frontal bone and the squamous portion of the temporal bone to about two inches above the upper border of the left ear. The periosteum was peeled up, exposing the bone for the whole length of the wound. It was closed by four silver wire sutures.

On the 16th erysipelas had developed, spreading in all directions. The sutures were removed, and lint saturated with hot water applied to the whole inflamed surface, and covered with oiled silk, held in place by a four-tailed bandage. On the following day the erysipelas had entirely subsided.

There was no constitutional treatment in this, nor any of the cases recorded, except where so specified.

CASE 6. *Erysipelas in a Compound Fracture; Removed in Twenty-four hours by Hot Fomentations.*—R. B., æt. 43 years, female, received a compound comminuted fracture of the lower third of the humerus March 14, 1875. 16*th.* Erysipelas developed, which spread rapidly to the middle of the arm by the afternoon of the same day. Hot fomentations were immediately applied, and on the following day the inflammation had all disappeared. No internal treatment.

CASE 7. *Idiopathic Phlegmonous Erysipelas of the Leg.*—Mrs. T., æt. 44 years, was attacked with simple erysipelas of the lower part of the left leg, but some kind friends recommended liniments, and under this treatment it spread rapidly, so that on the 9th of June, 1875, the whole leg from the ankle to the knee was found in a terribly inflamed condition, involving both the skin and subcutaneous cellular tissue. Hot fomentations were immediately commenced, consisting of cotton batting saturated with hot water, and covered with oiled silk. This to be re-wet every two hours.

11*th.* A small abscess was opened on the anterior portion of the leg just below the knee. The redness and swelling, which were very great, have subsided wonderfully.

13th. That portion of the leg where most of the liniment was used has become denuded of skin, but the inflammation has entirely subsided.

In this case tr. iron was given internally in large doses.

Traumatic Gangrene:

CASE 8. *Severe Laceration of both Dorsal and Plantar Surfaces of Left Foot, with Compound Fracture of First, Fourth, and Fifth Metatarsal Bones; Foot saved by Immersion in Warm Water.*—Charles G., æt. 47 years, labourer, received the above-named injury April 2, 1874.

5th. Foot looked gangrenous, and was submerged in water at 90° F., by advice of Dr. Hamilton, Consulting Surgeon. But for his knowledge of the value of warm water in such cases, he would have advised amputation at the ankle, as the only means of saving the patient's life. (The temperature of the bath was subsequently raised to 100° F.)

8th. The leg above the level of the water was a little œdematous.

9th. The whole dorsum of the foot is involved in the injury, and is sloughing.

10th. Where the tissues have sloughed fresh granulations are springing up.

12th. Ninth day of immersion, the œdema is much less. The whole dorsal surface has sloughed, leaving a fresh granulating surface. After the 15th the water bath was used during the day, and hot fomentations were applied at night. After the 19th hot fomentations alone applied.

22d. Three grafts applied to the dorsal surface, and hot fomentations continued.

26th. Water dressing discontinued. The grafts have taken nicely, and are spreading. Fresh grafts inserted.

May 1st. A few of the second crop of grafts have taken.

June 9th. When nearly well he was transferred to Bellevue Hospital. After his discharge he returned (August 10th) to show us that he had a good and useful foot.

CASE 9. *Gangrene following Fracture of the Leg; Spontaneous Amputation under the Water Bath.*—H. B., æt. 26 years, male, received, December 8, 1873, a simple fracture of the tibia and fibula at the lower third, with extensive laceration of the tissues, involving the vessels of the limb.

11th. The foot looked gangrenous, and sensation below the seat of fracture was entirely lost. An erysipelatous blush extended up the leg from the seat of fracture. The whole limb below the knee was immediately immersed in a water-bath at 100° F., by advice of Dr. Hamilton.

14th. The line of demarcation had formed at the seat of fracture, and the erysipelas had disappeared.

19th. The limb was removed at the seat of fracture by means of dressing forceps and scissors, with very little loss of blood, and hot fomentations applied to the stump. Patient recovered with a good stump after resection of about an inch of lower end of the tibia.

CASE 10. *Gangrene resulting from Severe Contusion of the Leg; Arrested by Warm Water.*—Thomas C., æt. 23 years, sustained, November 17, 1874, a severe contusion of his left leg and foot, with rupture of the smaller vessels, and extravasation of blood into the tissues of the whole leg. Compresses, saturated with lead and opium wash, applied, and the limb placed in a fracture box.

18*th.* The whole leg is black, the toes are cold and bloodless, and sensation of the foot is entirely lost.

22*d.* The line of demarcation is forming in one place just behind the internal malleolus.

24*th.* Gangrene is becoming more marked. Hot fomentations applied to the limb below the knee.

27*th.* Small sloughs behind the internal malleolus, and on the outer surface of the leg have separated, leaving healthy granulating surfaces. The remainder of the leg and foot are regaining a healthy appearance. No febrile disturbance. Several grafts were subsequently placed along the margin of the external wound, which took nicely. The wounds soon healed, and the patient made a good recovery.

Case 11. *Compound Fracture of the Foot, with Severe Laceration; Separation and Removal of the First and Second Phalanges of the Third Toe under the Water Bath.*—Bernard W., æt. 45 years, sustained the above injury January 11, 1874. On the following day, after all bleeding had ceased, the foot was immersed in a water-bath at 100° F.

13*th.* The lacerated tissues presented a gangrenous appearance.

19*th.* After some sloughing of the tissues the first and second phalanges of the third toe were found to be loose, and they were removed; and on the following day the first and second phalanges of the second toe were likewise removed.

23*d.* The wounds were granulating nicely. Hot fomentations were then used at night, and the water-bath during the day.

29*th.* Hot fomentations alone applied. Subsequently the wounds healed without complication.

Lacerated Wounds of the Scalp:

Case 12. *Compound Comminuted Fracture of the Anterior Table of the Occipital Bone.*—Edward B., æt. 27 years, labourer, sustained the above injury November 12, 1874. One silver suture, inserted in the centre of the wound, which was a long one, and the ends left open for drainage.

14*th.* The wound is suppurating, but the pus looks greenish and unhealthy, and small particles of bone are coming away with it. Hot fomentations applied.

16*th.* The wound is granulating nicely.

24*th.* The wound has healed without any complication.

Case 13. *Laceration of the Scalp an inch and a half long.*—James D., æt. 15 years, sustained the above injury September 1, 1874, the laceration extending longitudinally over the anterior superior angle of the right parietal bone. Two sutures were inserted and hot fomentations applied. The sutures were removed on the second day, and the wound had healed partly by first intention; and by the 8th it had healed entirely without any complication.

Case 14. *Laceration of the Scalp over Left Parietal Bone.*—Jeremiah C., æt. 11 years, sustained the above injury November 2, 1874. Hot fomentations applied at once. A surgeon opposed to warm water, at the time remarked that the patient was sent home for the wound to suppurate. But in his note of the 4th he states that the wound is healing nicely, and on the 10th the patient was discharged, cured without any complication.

The same surgeon, in treating an incised wound of the scalp a few days later, closed it with wire sutures. The third day after, when it commenced to suppurate and look unhealthy, he immediately applied warm water dressing, and the wound healed by granulation.

Cases 12 and 13 were treated in a hospital full of traumatic erysipelas.

Wounds of Compound Fractures and Lacerated Wounds in general:

CASE 15. *Compound Fracture of the Leg treated successfully by Warm Water.*—Thomas A., æt. 20 years, admitted to hospital March 11, 1874, with a compound fracture of the tibia and simple fracture of fibula at the junction of the middle and lower thirds. The limb was placed in a suspension apparatus and the wound dressed with hot fomentations immediately on admission.

April 5. The lower end of the tibia was found to be projecting, and on the 17th it was removed with bone nippers, the same treatment being continued.

27th. The wound was healing nicely, there having been no complication.

CASE 16. *Compound Fracture of the Tibia and Fibula; Plaster of Paris Splint applied; Fenestræ cut over the Wounds, which were treated successfully by Warm Water.*—William McG., æt. 35 years, was thrown from his wagon, the wheel of the vehicle passing over his leg. Admitted to hospital same day, September 15, 1874. On the following day a plaster-of-Paris splint was applied and fenestræ cut over the two wounds, to which hot fomentations were applied. The patient made a good recovery without any complication, the wounds healing by granulation.

CASE 17. *Compound Comminuted Fracture of the Radius; Recovery under Warm Water Treatment.*—Miles C., æt. 38 years, admitted December 18, 1874. While ramming a load of "giant powder," it exploded, splintering the ramrod, and driving a piece of it through the forearm at the lower third, with the effect of producing the above injury. A single palmar splint was at first applied, with a compress and bandage to control the bleeding.

On the following day the surfaces around the wound looked red and swollen, and the limb was placed in a suspension apparatus and hot fomentations applied to and around the wounds. By the next day (20th) there was marked improvement, the redness and swelling had entirely disappeared, and the wound was beginning to suppurate. The hot fomentations were continued until January 12, when the wounds were so nearly healed as to allow a re-application of the palmar leather splint. No complication followed.

CASE 18. *Pistol-shot Fracture of the Radius; Ball not removed until the Twenty-second Day after the Injury; Successful Treatment by Hot Fomentations without any Complication.*—Michael K., æt. 78 years, labourer, admitted January 26, 1875, on which day he received a pistol-shot wound of the forearm about two inches above the radius, fracturing that bone in several places, the ball passing in on the dorsal aspect and lodging. It could not be found. On the following day the limb was placed in a suspension apparatus, and hot fomentations applied to the wound.

Feb. 17th. The twenty-second day after the injury, an abscess was opened on the palmar surface, and the ball, with some small pieces of bone, came away with the pus. The hot fomentations were continued, and the patient made a good recovery without any further complication.

Cases 15, 16, 17, and 18 were treated in a hospital ward with pyæmia and traumatic erysipelas.

CASE 19. *Incision of both Superficial and Deep Palmar Arches; Secondary Hemorrhage occurring after the fourth week from the Deep Arch; Ligation of the Radial Artery; Subsequent Treatment of the Wound by Hot Fomentations.*—Thomas McM., æt. 16 years, applied for treatment of secondary hemorrhage from the deep palmar arch March 16, 1879, about four weeks after the accident. The extremities of the arch could not be reached in the wound, so the bleeding was controlled by a compress of styptic cotton to the wound, and he was advised to have the radial artery ligated. The patient objected strenuously, and the parents preferred to postpone it. They finally consented to the operation April 3d. At this time the margins of the wound were inflamed, and an erysipelatous blush extended up the wrist. Immediately after the operation the cotton was removed and hot fomentations applied to the wound and inflamed surface. On the following day the redness had entirely disappeared, and the wound was granulating.

At this date (April 16th) the wound of the hand has healed under the same dressing continued since the operation.

The following case will show the relative value of cold and hot water in acute inflammation:—

CASE 20. *Acute Inflammation of the Knee-joint developed under Extension.*—Katie D., æt. 4 years, who had been under treatment two years for chronic inflammation of the knee-joint, and was running around with Dr. Sayre's knee extension apparatus applied, was attacked suddenly with acute inflammation of the joint, without any ascertainable cause except the extension. Ice cloths were applied and the extension lessened, but the inflammation extended rapidly up the thigh and down the leg, accompanied with great swelling and redness, presenting the appearance of erysipelatous inflammation. The swelling was so great two days later (Jan. 24th, 1879) as to necessitate the removal of the instrument. The ice cloths were continued to the whole inflamed surface and around the joint, and a posterior wooden splint applied to keep the joint at rest.

26*th.* The inflammation of the tissues continued to extend and the joint was even worse. An ice bag was applied around the joint, and the cold cloths to the thigh and leg continued.

28*th.* The whole limb, from the middle of the thigh to the foot, was acutely inflamed, and the joint was exquisitely sensitive. It could not be touched without occasioning screams of agony from the little sufferer. It was even more sensitive than when last seen, and the inflammation of the tissues was extending rapidly. Warm water was immediately determined upon, and the whole limb was enveloped with hot fomentations and covered with oil silk.

30*th* (only two days later). The improvement was miraculous. The limb could be handled without causing pain, and the redness and swelling had nearly disappeared. The hot fomentations were continued, and in two days more she could stand upon the limb, and the joint could be moved without giving pain. The acute inflammation had entirely subsided. After this the hot fomentations were continued to the joint, and at this date (March 15th) she is walking around without an instrument (only a posterior wooden splint).

In conclusion I will refer to a case of phlegmasia dolens treated successfully by warm water, which was reported by me in the *Hospital*

Gazette of November 28, 1878. In this case, after all other means were exhausted and no relief obtained, it was determined to use hot fomentations, which gave immediate relief, and under their continued application a cure was effected.

Resumé.—From a study of these cases I think we are justified in concluding that in Case 1 erysipelas could have been prevented if *warm* water had been used instead of the tr. of iodine.

In Case 2 erysipelas could have been arrested in 24 hours had warm water been used at first.

In Case 3 the whole foot could have been saved, in the first place, if it had been immersed in a water-bath, for the injuries were less severe than in Case 8; but, unfortunately, our consulting surgeon was skeptical as to the value of the *warm water* dressing. And in the second place, had hot fomentations been applied when erysipelas first made its appearance, it could have been arrested, and the patient would have been saved much suffering.

Cases 4, 5, and 6 speak for themselves.

Amputation at the knee, or immediately below, would have been necessary in Case 9, if warm water had not been used; whereas, spontaneous amputation took place at the lower third of the leg. In this case, also, erysipelas was arrested by its use.

Case 10 shows that gangrene can be arrested by warm water, and also that grafts will take under warm water dressing.

In Case 11 amputation at the tarso-metatarsal joint was the indication, whereas by the use of warm water the whole foot was saved.

Erysipelas and pyæmia were prevented in Cases 15, 16, 17, and 18.

In Case 19 erysipelas was arrested. This case shows, also, that a wound will cicatrize completely under the warm water dressing.

ARTICLE X.

A COLORIMETRIC METHOD FOR THE QUANTITATIVE DETERMINATION OF THE BILIARY ACIDS AND COLOURING MATTER. By J. O. HIRSCHFELDER, M.D., Professor of Materia Medica in the Medical College of the Pacific, San Francisco.

HERETOFORE there has been no method for the quantitative determination of the biliary acids and colouring matter, which could be quickly performed with a small quantity of bile, and the need of such a method in a set of investigations of the bile led to the discovery of one combining the requisite qualities with tolerable accuracy.

The older methods for determining the biliary acids, the glycocholic and taurocholic acids, demand a great deal of time and attention, and